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Revision 0

Health and Safety Plan for the Waste Area Group 10 Track 2 Investigation Sites

Idaho Completion Project

Bechtel BWXT Idaho, LLC

April 2004

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Idaho Completion Project
Idaho Falls, Idaho 83415

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ABSTRACT

This health and safety plan describes measures that will be used to minimize or eliminate health and safety risks to personnel at Waste Area Group 10 Track 2 investigation sites at the Idaho National Engineering and Environmental Laboratory. These measures are required by the Occupational Safety and Health Administration standard, "Hazardous Waste Operations and Emergency Response" (29 CFR 1910.120). This plan also contains information about the hazards involved in doing the work and the specific actions and equipment that will be used to protect people at the task site.

This plan is intended to give health and safety professionals the flexibility to establish and modify site health and safety procedures during operations based on the existing and anticipated hazards.

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ACRONYMS

ACGIH	American Conference of Governmental Industrial Hygienists
ANSI	American National Standards Institute
anti-C	anti-contamination
ARDC	Administrative Record and Document Control
bgs	below ground surface
BIC	Balance of INEEL Cleanup
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFA	Central Facilities Area
CFR	Code of Federal Regulations
CPR	cardiopulmonary resuscitation
CWA	controlled work area
dBA	decibel A-weighted
dBC	decibel C-weighted
DOE	U.S. Department of Energy
DOE-ID	U.S. Department of Energy Idaho Operations Office
dpm	disintegrations per minute
DWA	designated work area
EC	emergency coordinator
EOCR	Experimental Organic-Cooled Reactor
EPA	U.S. Environmental Protection Agency
ERO	Emergency Response Organization
FFA/CO	Federal Facility Agreement and Consent Order
GDE	guide
HASP	health and safety plan

HAZMAT	hazardous material
HAZWOPER	hazardous waste operations and emergency response
HEPA	high-efficiency particulate air
HSO	health and safety officer
IDLH	immediately dangerous to life or health
IH	industrial hygienist
INEEL	Idaho National Engineering and Environmental Laboratory
ISMS	Integrated Safety Management System
JSA	job safety analysis
LEL	lower explosive limit
LTS	Long-Term Stewardship
MCP	management control procedure
NIOSH	National Institute of Occupational Safety and Health
OMP	Occupational Medical Program
OSHA	Occupational Safety and Health Administration
PEL	permissible exposure limit
PLN	plan
POD	plan of the day
PPE	personal protective equipment
ppm	parts per million
PRD	program requirements document
RadCon	Radiological Control
RCIMS	Radiological Control and Information Management System
RCT	radiological control technician
RWP	radiological work permit
SAD	site area director

STEL	short-term exposure limit
SWP	safe work permit
TLV	threshold-limit value
TRA	Test Reactor Area
TRAIN	Training Records and Information Network
TWA	time-weighted average
UV	ultraviolet
VPP	Voluntary Protection Program
WAG	waste area group
WCC	Warning Communications Center

Health and Safety Plan for Waste Area Group 10 Track 2 Investigation Sites

1. INTRODUCTION

1.1 Purpose

This health and safety plan (HASP) describes measures that will be used to minimize or eliminate health and safety hazards at Waste Area Group (WAG) 10 Track 2 investigation sites at the Idaho National Engineering and Environmental Laboratory (INEEL).

1.2 Scope and Objectives

This HASP addresses work activities associated with the Track 2 investigation of four Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) sites within WAG 10. These sites will be investigated for the presence and distribution of contaminants. The objective of this HASP is to meet the regulatory requirements of Occupational Safety and Health Administration (OSHA) standard "Hazardous Waste Operations and Emergency Response" (HAZWOPER) (29 Code of Federal Regulations [CFR] 1910.120). This HASP governs all work at the project sites.

This HASP has been reviewed and will be revised, as appropriate, by the health and safety officer (HSO) in conjunction with other project personnel and management to ensure its effectiveness and suitability.

1.3 Idaho National Engineering and Environmental Laboratory Site Description

The INEEL, formerly the National Reactor Testing Station, encompasses 569,135 acres (889 mi^2) and is located approximately 34 mi west of Idaho Falls, Idaho (Figure 1-1). The U.S. Department of Energy (DOE) Idaho Operations Office is responsible for the INEEL and designates authority to operate the INEEL to management and operating contractors.

The United States Atomic Energy Commission, now the DOE, established the National Reactor Testing Station (now the INEEL) in 1949, to build and test a variety of nuclear facilities. The INEEL has also stored transuranic radionuclides and radioactive low-level waste since 1952. Now the INEEL supports the engineering and operations efforts of the DOE and other federal agencies in the areas of nuclear safety research, reactor development, reactor operations and training, nuclear defense materials production, waste management technology development, energy technology and conservation programs, and DOE long-term stewardship programs.

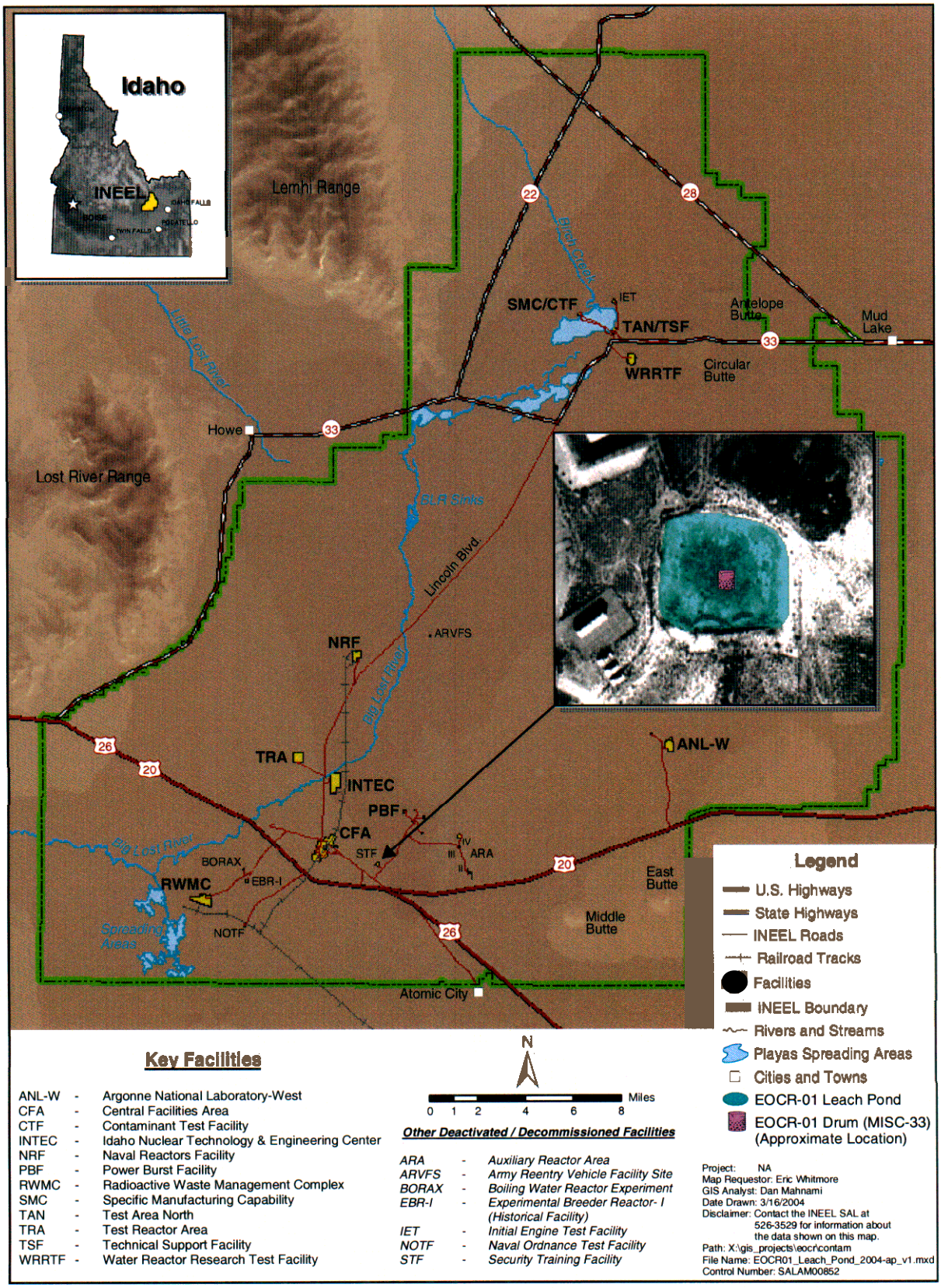

Figure 1-1. Map of the INEEL showing locations of major facilities.

1.4 Background and Project Site Description

The INEEL is divided into 10 WAGs under the *Federal Facility Agreement and Consent Order for the Idaho National Engineering Laboratory* (FFA/CO) (DOE-ID 1991). WAGs 1 through 9 correspond to primary facility areas at the INEEL, while WAG 10 corresponds to INEEL-wide concerns, including the Snake River Plain Aquifer. Potentially contaminated sites discovered after a record of decision has been signed are also included in WAG 10.

The four WAG 10 Track 2 sites to be investigated are as follows:

- The experimental test drum in the Experimental Organic-Cooled Reactor (EOCR)-01 leach pond (MISC-33)
- The soil-filled concrete ring (Central Facilities Area [CFA]-10A)
- The Test Reactor Area (TRA)-605 warm waste pipeline (TRA-63)
- The fenced area north of TRA-608 (TRA-60).

A brief description of the Track 2 activities for each of these sites and risk-based constituents of concern is provided below.

1.4.1 Experimental Test Drum in EOCR-01 Leach Pond (MISC-33)

The experimental test drum in the EOCR-01 leach pond (MISC-33), located approximately 2.5 miles southeast of the CFA, consists of a drum inside a stainless-steel cylinder and a metal/stainless-steel apparatus (Figures 1-1 and 1-2). The annulus between the drum and the stainless-steel cylinder contains soil. The drum itself contains ashes, thermocouples, graduated cylinders, beakers, stainless-steel blocks, pipettes, crucibles, and other items generated during a series of experiments conducted in the test drum. The tests, which were completed in May 1982, involved the explosive characterization of unleached ion exchange resins mixed with nitric acid. Based on the results of the experiments, the resin/nitric acid mixture posed no significant explosion risks (Scarpellino et al. 1984).

The constituents of concern at MISC-33 are lead and nitroaromatics. A radiological survey of surficial soils in the area was conducted in August 1991. The results of the survey indicated that only background radiological conditions exist at MISC-33. No other field-screening or laboratory data exist for MISC-33.

1.4.2 Soil-Filled Concrete Ring Adjacent to CFA-667 (CFA-10A)

CFA-10A, located near building CFA-667, consists of a soil-filled concrete ring discovered during the remediation of CFA-10, which is a yard that was used to store transformers (Figure 1-3). The concrete ring is about 4 ft in diameter, and its past use is unknown; however, it might be the upper portion of a dry well used to receive moisture from the driveway on the east side of CFA-667.

Because the nature of the soil-filled concrete ring is unknown, the constituents of concern are also unknown. Based on its location, however, the following constituents of potential concern were chosen: alpha-, beta-, and gamma-emitting radionuclides; semivolatile organic compounds; total petroleum hydrocarbons; and metals.

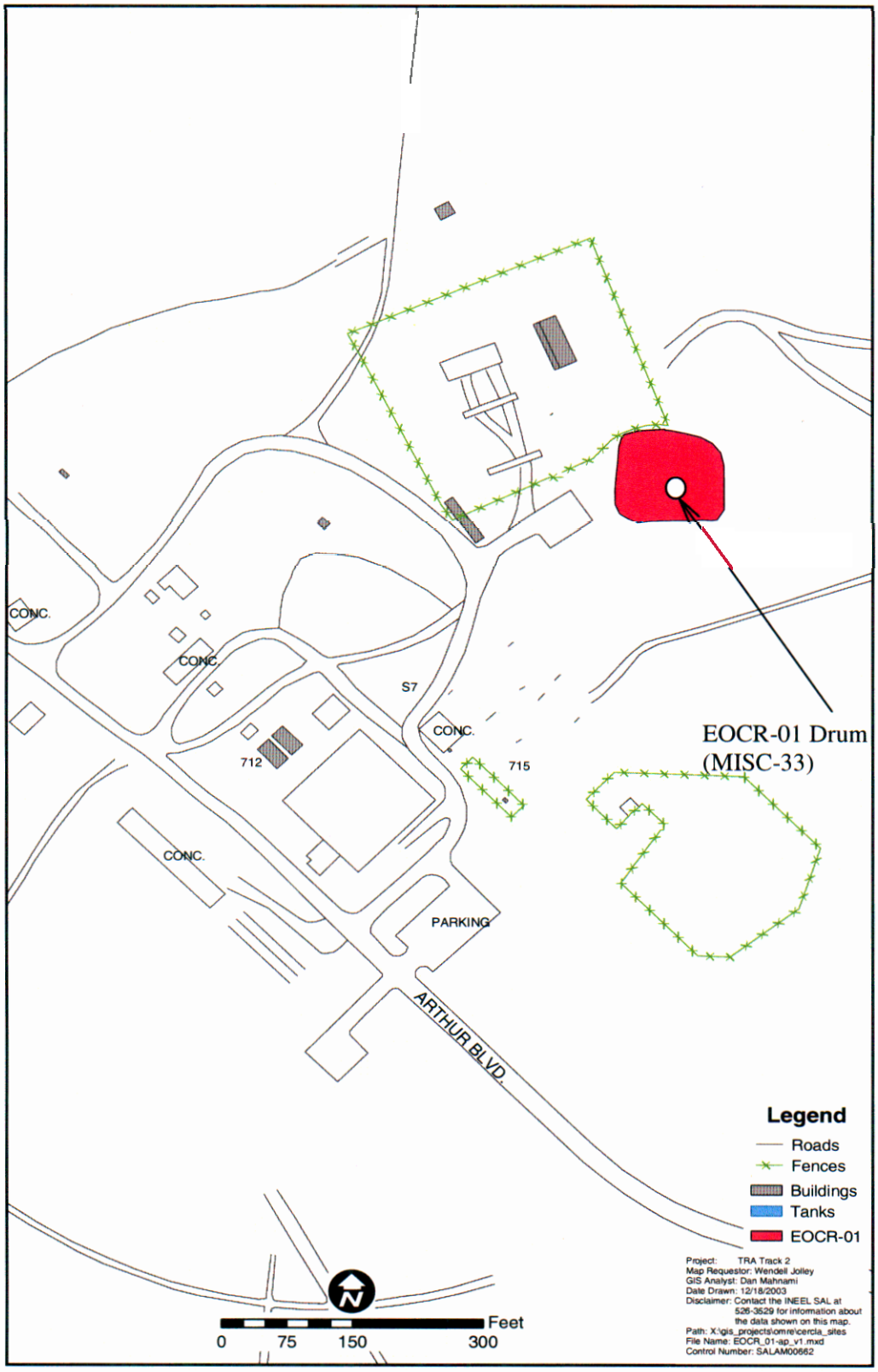

Figure 1-2. Experimental test drum in EOCR-01 leach pond (MISC-33).

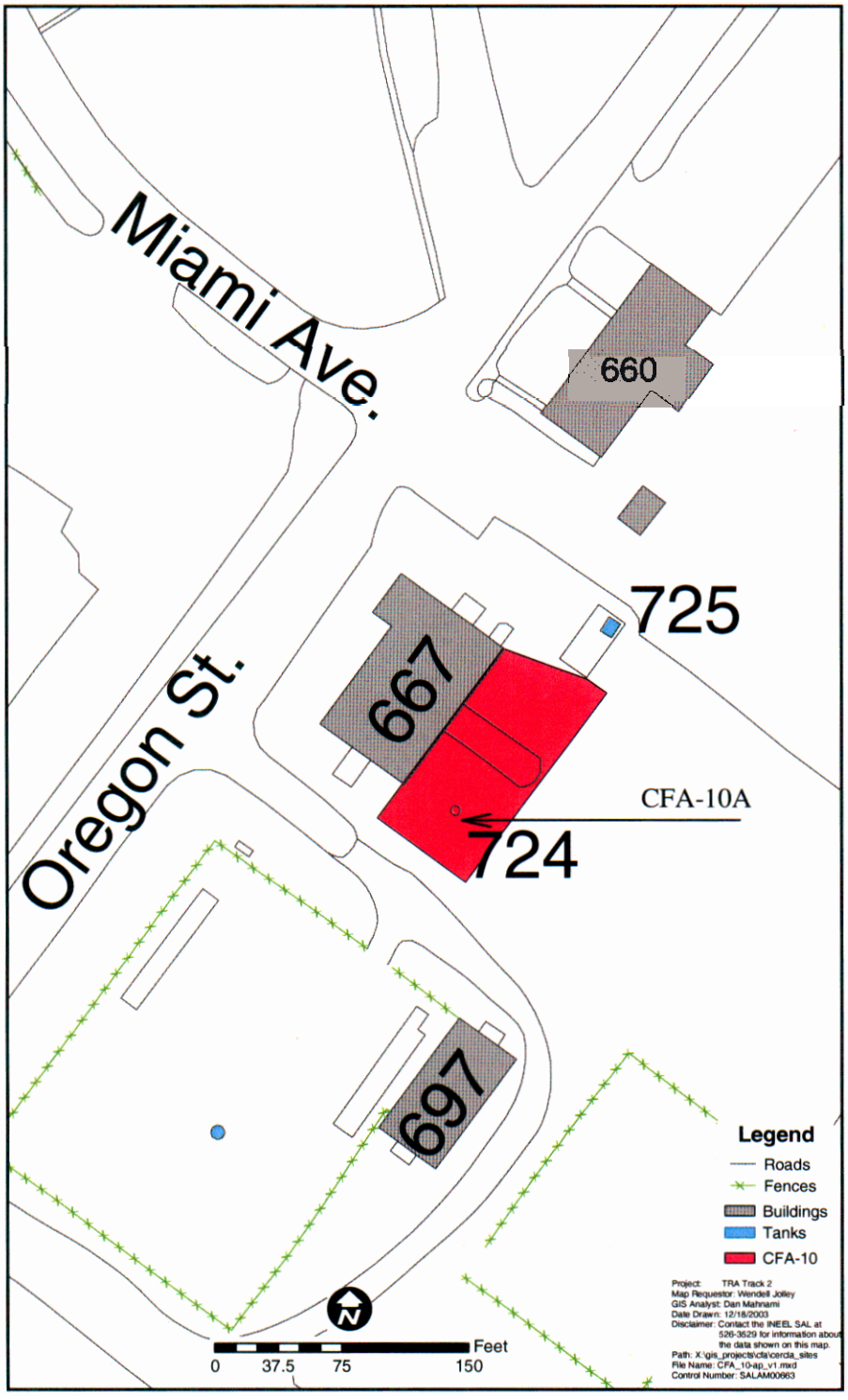

Figure 1-3. Soil-filled concrete ring (CFA-10A).

1.4.3 TRA-605 Warm Waste Line (TRA-63)

During the TRA-605 Warm Waste Pipeline Replacement Project in October 2001, soil exhibiting 30,000 disintegrations per minute (dpm) was discovered about 5 ft below ground surface (bgs). The area was further excavated, and a breach was found in the 4-in. Duriron warm wastewater pipeline at about 6 ft bgs. The pipe had a shear offset of about 1/2 in., with the offset constituting approximately 13% of the cross-sectional area of the pipe. Workers observed that the edges of the sheared area appeared corroded, suggesting that the pipe had been damaged for some time. Before pipeline repair began, contaminated water was seen issuing from the breach in the pipeline and from the surrounding formation. Approximately 3 gal of contaminated water had filled the excavation before the 4-in. Duriron warm wastewater pipeline was repaired. A radiological survey of the soil in the immediate vicinity of the pipeline confirmed the presence of 300,000 dpm of contamination. During this effort, approximately 4 yd^3 of contaminated soils was removed from the vicinity of the pipeline (Figure 1-4).

The constituents of concern at TRA-63 are radionuclides (i.e., alpha, beta, gamma, and tritium). The site has not been further characterized since the warm waste pipeline was repaired in October 2001.

1.4.4 Fenced Area North of TRA-608 (TRA-60)

The fenced area north of TRA-608 (TRA-60) (Figure 1-5) was used from 1952 to 1999 for support operations related to the TRA process water demineralizer process. The structures within the fenced area include two acid tanks (TRA-731D and -731E), two caustic tanks (TRA-731B and -731C), a pumphouse (TRA-631), a regenerant effluent neutralization tank (TRA-708C), a brine pit (TRA-731A [CERCLA Site TRA-20]), an east-west trench, and a north-south trench (CERCLA Site TRA-40). The piping and contaminated debris in the north-south trench were removed under NEW-TRA-006 of the Voluntary Consent Order during the spring of 2000. The brine pit, TRA-20 (TRA Brine Tank [TRA-731] at TRA-631), and the north-south trench, TRA-40 (TRA Tunnel French Drain [TRA-731]), were determined to be "no further action" sites in the Operable Unit 2-13 comprehensive record of decision signed in December 1997 (DOE-ID 1997).

TRA-708C, which was used as an elementary neutralization unit for the TRA-608 demineralizer process, leaked on November 3 and 4, 1996. The regenerant effluent was primarily composed of sulfuric acid and sodium hydroxide, and the releases at TRA-708C were classified as corrosive-characteristic hazardous waste. Furthermore, the commercial-grade sulfuric acid was found to be contaminated with mercury and lead. The total volume of the release at TRA-708C was estimated to be 1,500 gal.

1.5 Scope of Work

This Track 2 investigation will provide additional data for the remedial investigation/feasibility study of WAG 10 Operable Unit 10-08. The following subsections summarize the preliminary scope of investigation at each site addressed under this Track 2 investigation.

1.5.1 Experimental Test Drum in EOCR-01 Leach Pond (MISC-33)

The soil material, debris, and ash within the experimental test drum will be sampled during this Track 2 investigation. In addition, the soil within the annulus between the drum and the stainless-steel cylinder will be sampled using hand augers and trowels or equivalent sampling tools. The soil samples will be analyzed for lead and nitroaromatics.

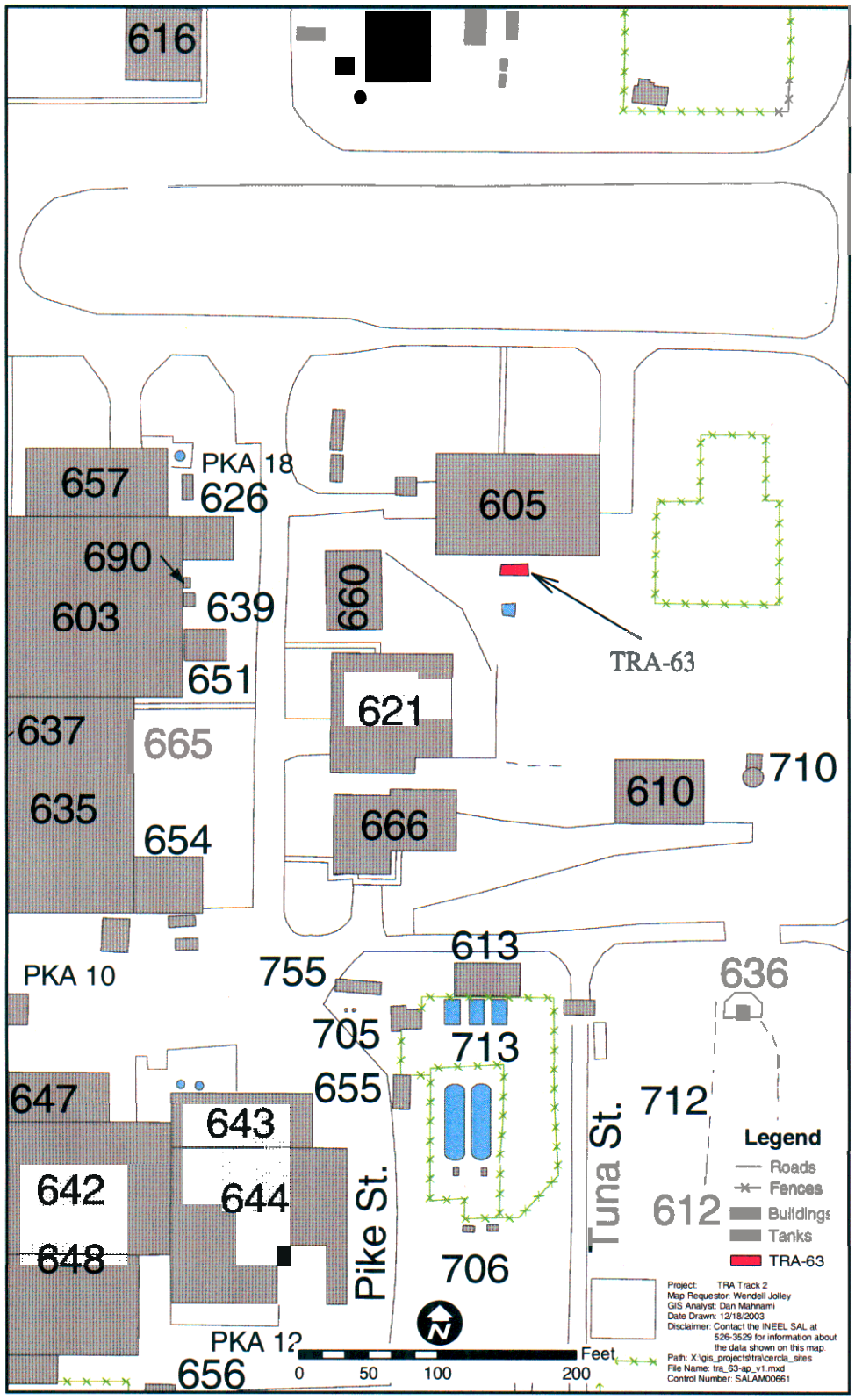

Figure 1-4. TRA-605 warm waste line (TRA-63).

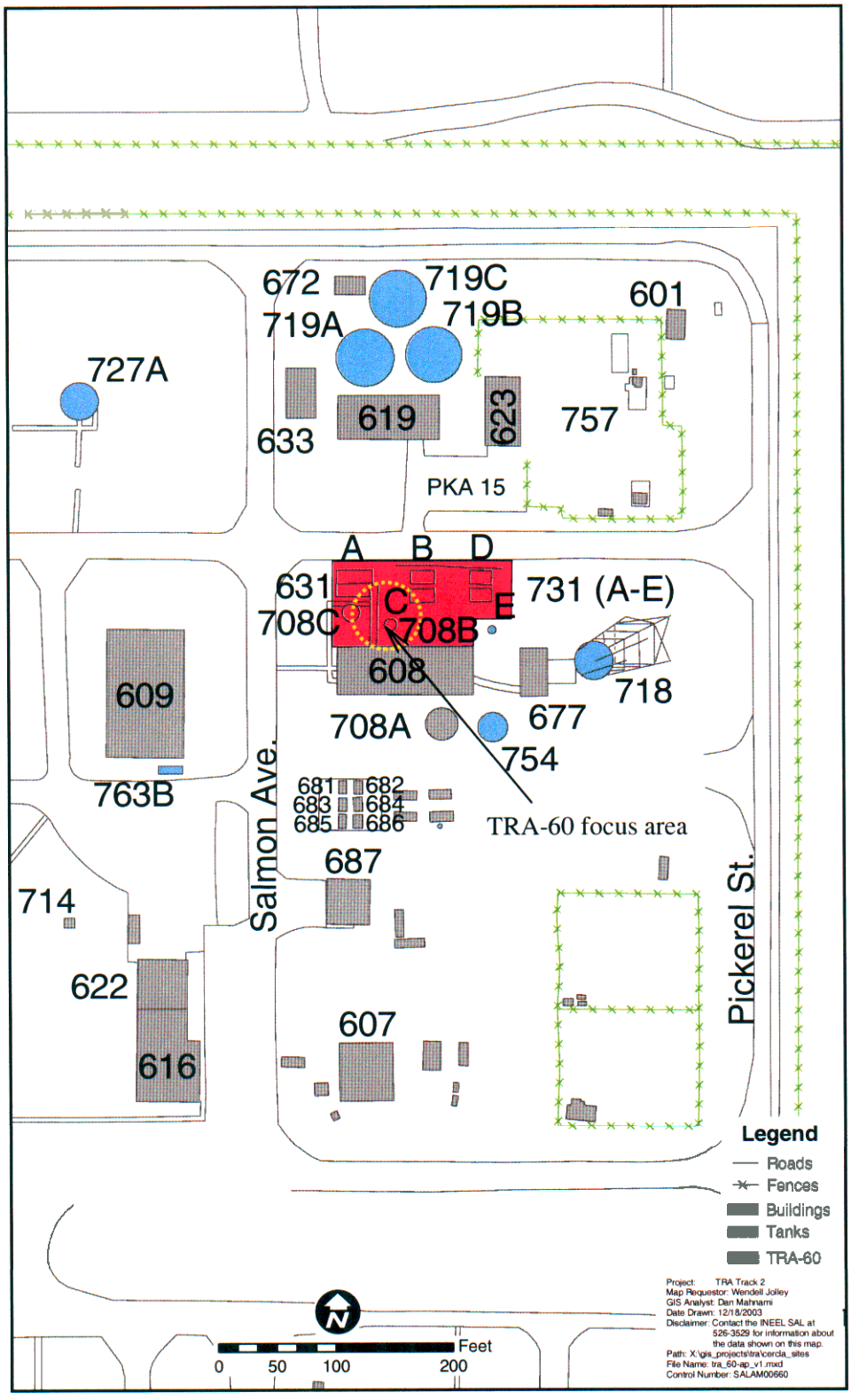

Figure 1-5. Fenced area north of TRA-608 (TRA-60).

1.5.2 Soil-Filled Concrete Ring (CFA-10A)

Because of the lack of information about the presence of contaminants at CFA-10A, several soil samples will be collected within and around the soil-filled concrete ring at various depths using hand augers and trowels or equivalent sampling tools to evaluate whether contaminated soils exist there. This information will be used to determine whether soils within the concrete ring pose a threat to human health or the environment.

1.5.3 TRA-605 Warm Waste Line (TRA-63)

Although the break in the warm wastewater pipeline near TRA-605 was repaired in 2001 and both ends of the pipeline were capped in the summer of 2002, the line itself still contains radioactively contaminated resin that could be released to the environment. In addition, the risks associated with the radioactive wastewater released from the warm waste pipeline, the potential pathways from the site, and the remedial action alternatives need further evaluation.

Soil will be excavated to expose the break in the pipe, and the excavated soils and exposed soil will be sampled to delineate the lateral extent of contamination. Limited soil sampling will also be conducted in the immediate vicinity of the break in the warm wastewater pipeline. An auger drill rig will then be used to collect samples to delineate the vertical extent of contamination.

1.5.4 Fenced Area North of TRA-608 (TRA-60)

Based on analysis of the results of previous sampling efforts, the soil contamination within TRA-60 poses a potential risk to human health and the environment. The sample results indicate that lead is present in soil near the base of TRA-708C at levels that exceed the U.S. Environmental Protection Agency (EPA) preliminary remediation goal (or maximum acceptance level) of 400 mg/kg. The sample results also indicate that mercury is present at low levels that pose a potential risk to the environment.

The scope of the Track 2 investigation at TRA-60 is focused on further characterizing the nature and extent of lead and mercury soil contamination. Samples will be collected using hand augers and trowels or equivalent sampling tools. The information gathered in this investigation will be used to evaluate the risk associated with the levels of lead and mercury contamination in soils at TRA-60 and to evaluate remedial action alternatives. This area is also an underground radioactive materials area, so radionuclides might be encountered.

2. HAZARD IDENTIFICATION AND MITIGATION

This section will help the user understand the occupational health and safety hazards associated with project tasks. Such an understanding will also enable project management and health and safety professionals to make effective and efficient decisions about equipment, processes, and procedures and the allocation of resources to protect people from hazards at the WAG 10 Track 2 investigation sites.

The overall objective of this section is to describe (a) existing and anticipated hazards and (b) controls that will be used to eliminate or mitigate these hazards. The hazard-mitigation objective will be met by using the following measures:

- Evaluating each project task for its potential to expose people to physical, chemical, radiological, and biological hazards from all routes of entry

- Establishing the monitoring and sampling required to evaluate the effectiveness of engineering and administrative controls, evaluate personal exposures and contamination levels, determine action levels to mitigate exposures, and provide specific steps to take if action levels are reached

- Determining engineering controls, isolation methods, administrative controls, work practices, and (where these measures will not adequately control hazards) personal protective equipment (PPE) that will further protect people at the investigation sites.

The risk that these hazards present to people entering work zones depends on the nature of the tasks being done and the proximity of people to the hazards. Whenever possible, engineering controls will be used along with administrative controls, work-control practices, and wearing of PPE to mitigate exposure to hazards. When applicable, hazard-mitigation measures listed in this section will also be integrated with existing INEEL work-control processes (e.g., technical procedures, work orders, job safety analyses [JSAs], and measures in Guide [GDE]-6212, "Hazard Mitigation Guide for Integrated Work Control Process").

Several tables in this section list chemical, radiological, physical, and environmental hazards that might be encountered during project operations. The corresponding mitigation methods and other control measures are also addressed. Table 2-1 summarizes the project tasks, the associated hazards, and the hazard-specific mitigation. Monitoring for specific hazardous agents is covered in Section 3.

2.1 Chemical and Radiological Hazards and Mitigation

Chemical hazards are present at several of the Track 2 sites to be investigated. But the potential for exposure to these chemical hazards during project tasks is minimal if standard operating procedures are followed and technical requirements are met. Table 2-2 lists the contaminants of concern and the maximum soil concentrations (where available) for the four Track 2 sites. Other hazards could also be present from chemicals and fuels in use at the project site. Table 2-3 lists the applicable exposure limits and brief toxicological information for each of the potential chemical hazards of concern and the primary sources for these hazards at each site.

Table 2-1. Project activities, associated hazards, and mitigation.

Activity or Task	Associated Hazards or Hazardous Agent	Hazard Mitigation
• Mobilize to/demobilize from Track 2 sites. • Hand trowel surface/hand auger soil, and collect samples. • Operate hollow-stem drill rig (or equivalent) (TRA-63 only). • Excavate using hand tools and mechanical means (TRA-60). • Backfill excavated area(s). • Decontaminate sampling equipment/drill split spoons.	1. Radiation/contamination (TRA-63/TRA-60/CFA-10A)—alpha, beta, and gamma emitters; potential dose rate near pipe; radioactive particles; and removable contamination. 2. Chemical contaminants—soil contaminants, lead, mercury, acidic resin, fuel at sites, decontamination residue/liquid, nitroaromatics, semivolatiles, and petroleum hydrocarbons. 3. Heavy equipment movement/vehicle traffic—swing radius, pinch points, struck-by and caught-between hazards, and overhead hazards. 4. Lifting and back strain—hand augering, material movement, sampling-materials handling, drill-flight handling, and hand excavation. 5. Open excavation(s) (TRA-63)—unstable soil, exposed contaminated soil, and fall hazard. 6. Tripping hazards/working-walking surfaces—uneven, unstable, or steep terrain; ice- and snow-covered surfaces; rocks and debris; and open excavations. 7. Heat and cold stress—outdoor activities. 8. Stored energy sources—buried utilities, elevated materials, raised equipment position, stacked/stored auger flights, and potential low pressure in TRA-63 pipe. 9. Flammable liquids—fueling of equipment on site (if required). 10. Hazardous noise—heavy equipment operation.	1. Ensure Radiological Worker II training, use radiological work permit (limiting conditions, electronic dosimetry with alarm set point, PPE, expected radiological fields and contamination levels, radiological control technician coverage, area posting), use survey instruments, use confining barriers (bags/sleeving for contaminated materials), and label bags with radiological survey results (radiation/contamination levels). 2. Control access to sites, provide material safety data sheets for chemicals in use, and use protective clothing when contact with materials is anticipated. Industrial hygienist is to assess exposure to validate the effectiveness of administrative controls and adequacy of PPE. For work at TRA-60, lead worker training is required. 3. Establish controlled areas, use qualified operators, ensure equipment and industrial vehicles have backup signals, ensure body position awareness (no one in swing radius), communicate verbally and visually with operator when in controlled area, and use PPE/high-visibility vests in controlled work area. 4. Use mechanical excavation equipment when feasible, use mechanical lifting device when possible, use proper lifting techniques, do not exceed 50-lb (or 1/3 body weight) lift limit, and do not work past fatigue point. 5. Apply Program Requirements Document (PRD)-22, use excavation-competent person, delineate and post area, and use barricade or other physical barrier where required in order to prevent vehicle and equipment from approaching edge. 6. Clear debris and other tripping hazards from areas where feasible, ensure body position awareness, and wear adequate footwear with nonskid/high-fiction soles. 7. Monitor conditions (via industrial hygienist), and use work/rest cycles in accordance with Management Control Procedure 2704. 8. Identify and mark all utilities before excavation (PRD-22), ensure all equipment is set in park or in gear with the brake set and the motor off when not in use, secure auger flights, and position all equipment buckets on ground when not in use. 9. Handle and store all flammable liquids per PRD-2201. 10. Hearing protection (ear plugs or ear muffs) must be worn when working around heavy equipment or with hand tools (greater than 85 decibels A-weighted). Industrial Hygiene will evaluate high noise producing work activities.

Table 2-2. WAG 10 Track 2 sites contaminants of concern.

Site	Contaminant of Concern	Sample Matrix Concentration
Experimental test drum at EOCR-01 leach pond (MISC-33)	Lead	Unknown
	Nitroaromatics	Unknown
Soil-filled concrete ring (CFA-10A)	Alpha, beta, and gamma emitters, semivolatile organic compounds, total petroleum hydrocarbons, and metals	Unknown
TRA-605 warm waste line (TRA-63)	Beta and gamma emitters	300,000 dpm (does not include alpha or tritium)
Fenced area north of TRA-08 (TRA-60)	Lead	80 – 510 mg/kg
	Mercury	0.05 – 1.0 mg/kg
	Radionuclides	Underground radioactive material area

Exposure pathways exist for metal contaminants and radionuclides at the WAG 10 Track 2 project sites. Engineering controls, monitoring, training, and work controls will mitigate contact and uptake of these hazards; however, the potential for exposure to contaminants still exists. Exposure pathways include the following:

- **Inhalation.** Inhalation of particulates containing metal constituents (at all sites but TRA-63) or radionuclides (at TRA-60/63 and CFA-10A) is possible during soil sampling, drilling, and excavation. Additionally, the potential for inhalation of mercury vapor exists at the TRA-60 site. Small particles (<1.0 μm) may be inhaled and reach the alveolar portion of the lungs. Water-soluble metal can then be absorbed into the blood. Inhalation of particulate radionuclides can result in ionization of surrounding tissue.

- **Skin Absorption and eye contact.** At all sites except TRA-63, metals in contaminated soil can be absorbed through unprotected skin, and acidic residue at EOCR-01 could cause chemical burns to unprotected skin and eyes. Contact with elemental mercury at TRA-60 can be readily absorbed through skin. Skin contact with radionuclide-contaminated soil at TRA-63 could result in personal contamination with a potential for uptake

Table 2-3. Evaluation of chemicals and potential agents that may be encountered

Material or Chemical (Chemical Abstract Service No.)	Exposure Limit[a]	Route(s) of Exposure	Symptoms of Overexposure (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[b]	Matrix or Source at Project Site
Lead (7439-92-1)	TLV – 50 µg/m^3 Action level = 30 µg/m^3 (29 CFR 1926.62, "Lead") **OR** A PEL in µg/m^3 equal to 400 divided by the number of hours worked per day for shifts longer than 8 hr	Inhalation, ingestion, skin, eyes	Weakness, lassitude, insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension	Eyes, gastrointestinal system, central nervous system, kidneys, blood, gingival tissue	No (ACGIH A3)	MISC-33: drummed material, adjacent soil, Trauzl block material in leach pond CFA-10: CFA-667 area contaminated soil TRA-60: TRA-708C contaminated soil
Mercury (7439-97-6)	TLV – 0.025 mg/m^3 – skin STEL – 0.03 mg/m^3	Inhalation, ingestion, skin, eyes	Irritated eyes, skin; cough, chest pain, dyspnea (breathing difficulty), bronchitis, pneumonitis; tremor, insomnia, irritability, indecision, headache, lassitude (weakness, exhaustion); stomatitis, salivation; gastrointestinal disturbance, anorexia, weight loss; proteinuria	Eyes, skin, respiratory system, central nervous system, kidneys	No (ACGIH A4)	TRA-60: TRA-708C contaminated soils
Nitric acid (7697-37-2)	TLV – 2 ppm STEL – 4 ppm	Inhalation, ingestion, skin, eyes	Irritated eyes, skin, mucous membrane; delayed pulmonary edema, pneumonitis, bronchitis; dental erosion	Eyes, skin, respiratory system, teeth	No	MISC-33: nitric-acid-treated resins in leach pond
Petroleum hydrocarbons (not specified)	Chemical-specific	Inhalation, ingestion, skin, eyes	Eye irritation; respiratory system changes; dermatitis	Eyes, respiratory system	No	CFA-10A: potential contaminant

Table 2-3 (continued).

Material or Chemical (Chemical Abstract Service No.)	Exposure Limit[a]	Route(s) of Exposure	Symptoms of Overexposure (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[b]	Matrix or Source at Project Site
Nitroaromatics (compounds such as DNT, TNT, and degradation compounds)	Chemical-specific	Inhalation, ingestion, skin, eyes	Irritated skin, mucous membrane; liver damage, jaundice; cyanosis; sneezing; cough, sore throat; peripheral neuropathy, muscle pain; kidney damage; cataract; sensitization dermatitis; leukocytosis (increased blood leukocytes); anemia; cardiac irregularities	Eyes, skin, respiratory system, blood, liver, cardiovascular system, central nervous system, kidneys	No	CFA-10A: potential in ring soil EOCR-01: test drum
Semivolatile organic compounds (not specified)	Chemical-specific	Inhalation, ingestion, skin, eyes	Chemical-specific	Chemical-specific		CFA-10A: potential in ring
Diesel fuel (68476-34-6) (68334-30-5) (68334-30-2) (68476-31-3) (77650-28-3)	TLV – 100 mg/m^3 (ACGIH – as total hydrocarbons)	Inhalation, ingestion, skin, eyes	Eye irritation; respiratory system changes; dermatitis	Eyes, respiratory system	No	Fuel handling during refueling of diesel-powered equipment
Diesel exhaust particulate	TLV – withdrawn in 2003 TLV booklet	Inhalation	Respiratory, nose, throat or lung irritation with stinging and redness of the eyes; headache; nausea; dizziness; unconsciousness	Respiratory system	No	Exhaust from diesel-powered equipment
Radionuclides (radiation dose) (as listed on Table 2-2)	As low as reasonably achievable, dose limit, in accordance with radiological work permit Posting of radiation areas in accordance with PRD-183 TLDs will be used to measure whole body TEDE	Whole body	Alarming electronic dosimetry or stationary radiation monitors or alarms, criticality alarm, and elevated readings on direct reading instruments	Blood-forming cells, gastrointestinal tract, and rapidly dividing cells	Yes – IARC	Potential sources at CFA-10A, TRA-605, and TRA-60

Table 2-3 (continued).

Material or Chemical (Chemical Abstract Service No.)	Exposure Limit[a]	Route(s) of Exposure	Symptoms of Overexposure (Acute and Chronic)	Target Organs and System	Carcinogen? (Source)[b]	Matrix or Source at Project Site
Radionuclides (fixed and removable surface contamination)	As low as reasonably achievable, dose limit, in accordance with radiological work permit Posting of contamination areas in accordance with PRD-183	Inhalation, injection, broken skin	High counts on portable air samplers, direct-reading instruments, swipe counter (scaler), and alarm indication on personal contamination monitor	Gastrointestinal tract, ionization of internal tissue through uptake of radionuclides	Yes – IARC	Potential sources at CFA-10A, TRA-605, and TRA-60

a. Permissible exposure limit (PEL), threshold limit value (TLV), and short-term exposure limit (STEL). Sources: *Threshold Limit Values (TLVs®) and Biological Exposure Indices (BEIs®) Booklet* (ACGIH 2003) and substance-specific standards (29 CFR 1910.1000).

b. If yes, the agency and appropriate designation are identified (i.e., American Conference of Governmental Industrial Hygienists [ACGIH] A1 or A2 and International Agency for Research on Cancer [IARC]).

- **Ingestion.** Ingestion of metals (at all sites except TRA-63) and radionuclides (at TRA-63) is possible during soil sampling. Uptake of metal or radionuclides through the gastrointestinal tract could result in irritation of the gastrointestinal tract, irradiation of internal tissue, and/or deposition in target organs.

- **Injection.** Injection of metals or radionuclides is possible if the skin is broken or an existing wound is unprotected during handling of debris associated with the EOCR-01 drum materials or when sampling contaminated soils or equipment. Injection of metals or radionuclides can result in localized irritation, contamination, uptake of soluble contaminants, and deposition of insoluble contaminants.

Chemical and radiological hazards will be eliminated or mitigated to the extent possible during all project tasks. When they cannot be eliminated or mitigated, chemical and radiological hazards will be monitored (as described in Section 3) to ensure control measures are adequate. Additionally, administrative controls, training, work procedures, and protective equipment will be used to further reduce any likelihood of exposure to these hazards. Table 2-1 summarizes each primary project task, associated hazards, and hazard-specific mitigation.

Safe work permits (SWPs) and radiological work permits (RWPs) can be used in conjunction with this HASP and other work controls to address specific hazardous operations (e.g., hot work) and radiological conditions at specific project sites. When used, these permits will specify the PPE and dosimetry requirements for the task.

2.2 Safety and Physical Hazards and Mitigation

Industrial-safety and physical hazards will present the greatest hazards at the Track 2 project sites. Subsection 4.2 describes general safe work practices that must be followed at all times. The following subsections describe the specific industrial-safety hazards related to the Track 2 investigation and the procedures to be followed to eliminate or minimize these hazards.

2.2.1 Powered Equipment and Tools

Powered equipment and tools used at the WAG 10 Track 2 sites present potential physical hazards (such as pinch points, electrical shock, and flying debris). All portable equipment and tools will be properly maintained and used according to the manufacturer's specifications by qualified individuals. At no time will guards be removed. Program Requirements Document (PRD)-5101, "Portable Equipment and Handheld Power Tools," will be followed for all work done with powered equipment, including powered hand tools. All tools will be inspected by the user before use.

2.2.2 Material Handling and Back Strain

Material handling and maneuvering of various pieces of equipment could result in employee injury. All lifting and material handling will be done in accordance with Management Control Procedure (MCP)-2692, "Ergonomics Program." Personnel will not lift objects weighing more than 50 lb or one-third of their body weight (whichever is less) alone. Additionally, back strain and ergonomics must be considered before handling material and using equipment. When moving large or heavy materials, personnel should use mechanical and hydraulic lifting devices if possible. The industrial hygienist (IH) may conduct ergonomic evaluations of various project tasks to ascertain ergonomic hazards and recommend ways to mitigate these hazards. Applicable requirements from MCP-2739, "Material Handling, Storage, and Disposal," will also be met.

2.2.3 Repetitive Motion and Musculoskeletal Disorders

Project tasks might expose personnel to repetitive-motion hazards, undue physical stress, overexertion, awkward postures, or other ergonomic risk factors that could lead to musculoskeletal disorders. Musculoskeletal disorders can cause conditions such as pain, numbness, tingling, stiff joints, difficulty moving, muscle loss, and sometimes paralysis. The project IH will evaluate project tasks and recommend ways to reduce the potential for musculoskeletal disorders in accordance with MCP-2692, "Ergonomics Program."

2.2.4 Working and Walking Surfaces

Slippery or uneven work surfaces can increase the likelihood of back injuries, overexertion injuries, slips, and falls. The Track 2 project sites are located in the field and might present inherent tripping hazards such as uneven ground, vegetation, or debris. Tripping and slip hazards will be evaluated during the course of the project in accordance with PRD-5103, "Walking and Working Surfaces."

2.2.5 Fire and Flammable Materials Hazards

Fuel will be needed during drilling and excavation. Hazards exist during transfer of flammable or combustible liquids. Portable fire extinguishers with a minimum rating of 10A/60BC will be strategically located at the site to combat Class ABC fires. Fire extinguishers will be located in all active work areas, on or near all facility equipment that has exhaust heat sources, and on or near all equipment capable of generating ignition or a spark.

2.2.5.1 Combustible Materials. Combustible or ignitable materials in contact with or near exhaust manifolds, catalytic converters, or other ignition sources could start a fire. Accumulation of combustible materials will be strictly controlled. Disposal of combustible materials will be assessed at the end of each day. Class A combustibles such as trash, cardboard, rags, wood, and plastic will be properly disposed of in appropriate waste containers.

2.2.5.2 Flammable and Combustible Liquids. Fuel at the site must be safely stored and used. Only containers approved by Factory Mutual/Underwriters Laboratories for flammable liquid and labeled with the contents will be used to store fuel. All fuel containers will be stored at least 50 ft from any facilities and ignition sources or stored inside an approved flammable storage cabinet. Additional requirements are provided in PRD-2201, "Flammable and Combustible Liquid Storage." Portable motorized equipment (e.g., generators and light plants) will be shut off and allowed to cool in accordance with the manufacturer's operating instructions before refueling in order to minimize fire potential.

2.2.5.3 Welding, Cutting, or Grinding. Personnel who weld, cut, or grind might be exposed to molten metal, slag, and flying debris. Additionally, a fire might start if combustible materials are not cleared from the work area. Requirements in PRD-5110, "Welding, Cutting, and Other Hot Work," will be met during these activities.

2.2.6 Heavy Equipment and Moving Machinery

Heavy equipment might be used at the TRA-63 site to expose the pipe and remove contaminated soil. Hazards associated with the operation of heavy equipment include injury to personnel (e.g., struck-by and caught-between hazards) and equipment and property damage. All heavy equipment will be operated in the manner it was intended for and in accordance with manufacturer's instructions. Only authorized, qualified personnel will be allowed to operate equipment. Personnel near operating heavy equipment must maintain visual contact with the operator and, if excavation equipment is used,

stay clear of the swing radius. Personnel will comply with PRD-2020, "Heavy Industrial Vehicles," and PRD-2019, "Motor Vehicle Safety."

2.2.7 Drilling Hazards

An auger drill rig will likely be used to collect subsurface samples at the TRA-63 site to ascertain the vertical extent of contamination from the pipe. Drilling personnel will be aware of drilling equipment hazards and body positioning during all material-handling tasks. Specific hazards associated with drill rigs are described below.

2.2.7.1 Catlines. Catlines are used on drilling rigs to hoist materials. Catline accidents can injure the worker doing the rigging and the operator. Minimal control over hoisting materials can cause sudden and erratic load movements, which can cause struck-by or caught-between types of injuries.

2.2.7.2 Working Surfaces. The rig floor is the working surface for most tasks done in well-drilling operations. The surface is often wet from circulating fluid, muddy cuttings, and water used during drilling operations or removed from the borehole. Slippery work surfaces can increase the possibility of back injuries, overexertion injuries, slips, and falls.

2.2.7.3 Materials Handling. The most common type of accident in materials handling occurs when a finger or toe gets caught between two objects. Rolling stock can shift or fall from a pipe rack or truck bed. Fingers and hands can be caught between sampling barrels, breakout vices, and tools.

2.2.8 Excavation, Surface Penetrations, and Outages

A combination of hand excavation and heavy equipment will be used to expose the TRA-63 pipe. A drill rig will also be used to auger below the ground surface to ascertain the extent of contamination. No surface penetrations will be allowed until the area has been evaluated and an approved subsurface evaluation has been documented. All surface penetrations and related outages will be coordinated through the field supervisor and TRA operations personnel and will require submittal of Form 433.1, "Outage Request." The submission of an outage request will not be considered approval to start the work.

All excavation and surface penetration activities will be conducted and monitored in accordance with PRD-22, "Excavation and Surface Penetration," and 29 CFR 1926, Subpart P, "Excavations." Key elements from these requirements include the following:

- An excavation-competent person will inspect excavations and protective systems daily for evidence of situations that could result in possible cave-ins, protective system failure, hazardous atmospheres, or other hazardous conditions. Such inspections will be conducted before work starts and as needed throughout the shift. Inspections will also be conducted after any hazard-increasing occurrence, but inspections are required only when increased employee exposure can be reasonably anticipated.

- Stop logs, barricades, or chocks may be deployed if necessary to prevent vehicles and heavy equipment from falling into open excavations and trenches. If an excavation must be left open and unattended, the area surrounding it must be secured. The area must be clearly posted with caution signs and signs prohibiting unauthorized personnel from entering. Every effort must be made to fill the open excavations as soon as practicable.

- Any support systems, shield systems, and other protective systems that are used must be selected and constructed in accordance with the requirements in 29 CFR 1926, Subpart P.

2.2.9 Hoisting and Rigging of Equipment

Hoisting and rigging of equipment using a catline or equivalent hoist is only anticipated for drilling activities during movement of auger flights and core barrels. All hoisting and rigging will be done in accordance with PRD-600, "Maintenance Management Requirements," and DOE-STD-1090-01, "Hoisting and Rigging." Hoisting and rigging equipment will show evidence of a current inspection (e.g., tag) and be inspected before use by qualified personnel.

2.2.10 Overhead Objects

Personnel might be exposed to overhead materials and equipment, falling overhead materials, and other overhead hazards. Sources of these hazards will be identified and mitigated in accordance with PRD-5103, "Walking and Working Surfaces." Overhead impact hazards will be identified and then mitigated through the use of engineering controls and protective systems.

2.2.11 Decontamination

Decontamination procedures for personnel and equipment are detailed in Section 11. Potential hazards to personnel doing decontamination tasks include back strain; slip, trip, and fall hazards; and cross-contamination from contaminated surfaces. Additionally, electrical hazards might be present if powered equipment (such as a powered pressure washer) is used. Mitigation of these working-surface and electrical hazards is addressed in other subsections above. If a power washer or heated power washer is used, units will be operated in accordance with the manufacturer's operating instructions, personnel will wear appropriate PPE to prevent high-pressure spray injuries, personnel will use ground-fault circuit protection, and these tasks will only be conducted in approved areas. Personnel will wear required PPE at all times during decontamination tasks, as listed in Section 5.

2.2.12 Personal Protective Equipment

Wearing PPE will reduce a worker's ability to move freely, see clearly, and hear directions and noise that might indicate a hazard. In addition, PPE can increase the risk of heat stress. Work activities at the task site will be modified as necessary to ensure that personnel are able to work safely in the required PPE. Work-site personnel will comply with PRD-5121, "Personal Protective Equipment," and MCP-432, "Radiological Personal Protective Equipment," if radiological hazards are encountered. All personnel who wear PPE will be trained in its use and limitations in accordance with PRD-5121.

2.3 Environmental Hazards and Mitigation

The environment of the project task sites will present hazards. These hazards will be identified and mitigated to the extent possible. This subsection describes these environmental hazards and states the mitigative procedures and work practices that will be followed.

2.3.1 Noise

Drilling and heavy-equipment activities could expose personnel to loud noises that will require the use of hearing protection. The potential effects of loud noise include the following:

- Personnel being startled, distracted, or fatigued
- Physical ear damage, pain, and temporary or permanent hearing loss
- Interference with communication that would warn of danger.

Personnel will be required to wear hearing protection during heavy-equipment and drill-rig operations when noise levels exceed 84 decibels A-weighted (dBA). Hearing protection devices will be selected and worn in accordance with MCP-2719, "Controlling and Monitoring Exposure to Noise."

2.3.2 Temperature and Ultraviolet Light Hazards

Project tasks will take place during times when heat or cold stress could present a hazard to personnel. The IH and HSO will be responsible for obtaining meteorological information to determine if additional heat or cold stress administrative controls are required. Project personnel must understand the hazards associated with heat and cold stress and take preventive measures to minimize the effects. MCP-2704, "Heat and Cold Stress," will be followed when establishing work/rest schedules or deciding when to halt work because of temperature extremes.

2.3.2.1 Heat Stress. High ambient air temperatures can cause increased body temperature, heat fatigue, heat exhaustion, or heat stroke that can lead to physical discomfort, unconsciousness, and death. In addition, tasks requiring the use of protective equipment or respiratory protection prevent the body from cooling. Personnel must inform the HSO or project field leader when experiencing any signs or symptoms of heat stress or observing a fellow employee (i.e., buddy) experiencing them. The HSO, in conjunction with the IH, will document heat stress stay times or work/rest regimens on the appropriate work-control document(s), i.e., an SWP, Pre-Job Briefing Form, or other documentation (as required). These stay times will take into account the amount of time spent on a task, the nature of the work (i.e., light, moderate, or heavy), type of PPE worn, and ambient work temperatures. Table 2-4 lists the signs and symptoms of heat stress.

Table 2-4. Heat-stress signs and symptoms.

Heat-Related Illness	Signs and Symptoms	Emergency Care
Heat rash	Red skin rash and reduced sweating.	Keep the skin clean, change all clothing daily, and cover affected areas with powder that contains cornstarch or with plain cornstarch.
Heat cramps	Severe muscle cramps and exhaustion, sometimes with dizziness or periods of faintness.	Move the patient to a nearby cool place; give the patient half-strength electrolytic fluids; if cramps persist or if signs that are more serious develop, seek medical attention.
Heat exhaustion	Rapid, shallow breathing; weak pulse; cold, clammy skin; heavy perspiration; total body weakness; dizziness that sometimes leads to unconsciousness.	Move the patient to a nearby cool place, keep the patient at rest, give the patient half-strength electrolytic fluids, treat for shock, and seek medical attention. DO NOT TRY TO ADMINISTER FLUIDS TO AN UNCONSCIOUS PATIENT.
Heat stroke	Deep, then shallow, breathing; rapid, strong pulse and then rapid, weak pulse; dry, hot skin; dilated pupils; loss of consciousness (possible coma); seizures or muscular twitching.	Cool the patient rapidly. Treat for shock. If cold packs or ice bags are available, wrap them and place one bag or pack under each armpit, one behind each knee, one in the groin, one on each wrist and ankle, and one on each side of the neck. Seek medical attention as soon as possible. Monitor the patient's vital signs constantly. DO NOT ADMINISTER FLUIDS OF ANY KIND.

Note: Heat exhaustion and heat stroke are extremely serious conditions that can cause death and should be treated as such. The field supervisor or designee should immediately request that an ambulance (777 or 526-1515) be dispatched from the CFA-1612 medical facility, and the individual should be cooled as described in Table 2-4 based on the nature of the heat-stress illness.

2.3.2.2 Low Temperatures and Cold Stress. Although project tasks will likely be completed during spring and summer months, personnel could be exposed to low temperatures if activities continue into the fall and winter months. However, cold stress is also a concern at other times of the year if relatively cool ambient temperatures combine with wet or windy conditions. MCP-2704, "Heat and Cold Stress," will be followed.

Additional cold weather hazards may exist when working on snow- or ice-covered surfaces. Slip, fall, and material-handling hazards increase under these conditions. Every effort must be made to ensure walking surfaces are kept clear of ice. The HSO should be notified immediately if slip or fall hazards are identified at the project sites.

2.3.2.3 Ultraviolet Light Exposure. Personnel will be exposed to ultraviolet (UV) rays when conducting project tasks. Sunlight is the main source of UV rays known to damage the skin and to cause skin cancer. The amount of UV exposure depends on the strength of the light, the length of exposure, and whether the skin is protected. No UV rays or suntans are safe. The following are actions that can be taken to minimize UV exposure:

- Wear clothing to cover the skin (long pants and long-sleeve or short-sleeve shirt).
- Use sunscreen lotion with a sun protection factor of at least 15.
- Wear a hat (hard hat where required).
- Wear UV-absorbing safety glasses.
- Limit exposure during the peak-intensity hours between 10 a.m. and 4 p.m. whenever possible.

2.3.3 Inclement Weather

When inclement or adverse weather poses a threat to people or property at the project site (e.g., sustained winds 25 mph or greater, electrical storms, heavy precipitation, or extreme heat or cold), the HSO will evaluate the conditions and decide, with input from other personnel, whether to halt work, use compensatory measures, or proceed. All work will comply with INEEL MCPs and facility work-control documents that specify limits for inclement weather.

2.3.4 Biological Hazards

The INEEL is located in an area that provides habitat for various rodents, insects, and vectors (i.e., organisms that carry disease-causing microorganisms from one host to another). The potential exists for encountering nesting materials or other biological hazards and vectors. The Hantavirus may be present in the nesting and fecal matter of deer mice. If such materials are disturbed, they can become airborne and create an inhalation pathway for the virus. Contact with and improper removal of these materials can provide additional inhalation exposure risks.

If a suspected rodent nest or excrement is encountered, the IH will be notified immediately, and **no attempt will be made to remove or clean the area** at that time. After an evaluation of the area, such material will be disinfected and removed in accordance with MCP-2750, "Preventing Hantavirus Infection."

Snakes, insects, and arachnids (e.g., spiders and ticks) might be encountered, too. Common areas to avoid include material-stacking and staging areas, under existing structures (e.g., trailers and buildings), under boxes, and other areas that provide shelter. Protective clothing will generally prevent insects from direct contact with the skin. If potentially dangerous snakes or spiders are found or are suspected of being present, warn others, keep clear, and contact the IH or HSO for additional guidance.

Insect repellant (with DEET or an equivalent active ingredient) might be required. Areas where standing water has accumulated provide breeding grounds for mosquitoes and should be avoided. In cases where a large area of standing water is encountered, pumping the water out of the declivity might be necessary.

2.3.5 Confined Spaces

The TRA-63 excavation is not anticipated to present hazardous atmospheres, and no other confined spaces are anticipated to be encountered at the Track 2 project sites. The excavation-competent person will contact the project IH if there is any question as to whether an excavation could contain a hazardous atmosphere or if another Track 2 space meets the definition of a confined space. If entry into a confined space is required, then MCP-2749, "Confined Spaces," will be followed.

2.4 Other Task-Site Hazards

Task-site personnel should continually look for potential hazards and immediately inform the field supervisor or HSO of these hazards so that the condition can be corrected. All personnel have the authority to stop work in accordance with MCP-553, "Stop Work Authority," if they perceive an imminent hazard exists.

Personnel working at the task site are responsible for using safe work practices, reporting unsafe working conditions or acts, and exercising good housekeeping habits with respect to tools, equipment, and waste throughout the course of the project.

2.5 Site Inspections

Project personnel can participate in site inspections during the work-control preparation stage (such as the hazard identification and verification walk-downs), self-assessments, or other inspections.

Targeted or required self-assessments will be done during operations in accordance with MCP-8, "Performing Management Assessments and Management Review." Health and safety professionals at the task site can, at any time, recommend changes in work habits. However, all changes that might affect the work-control documents must have concurrence from the appropriate project technical representatives, and a data analysis report must be prepared if required.